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# Evaluation of Comments on the Proposed Standards for Management of Sewage Sludge Non-Agricultural Land Application

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# Non-Agricultural Land Application

by
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The report is part of the National Network for Environmental Management Studies under the auspices of the Office of Cooperative Environmental Management of the U.S. Environmental Protection Agency.

On February 6, 1989 EPA proposed 40 CFR Parts 257 and 503 Standards for the disposal of Sewage Sludge. Comments on this Proposal Rule were received from 524 different entities. This paper presents those specific to non-agricultural land application.

There were four major types of commenters on the Proposed Rule: 1) the sludge generators, 2) the regulators, 3) scientists, and 4) environmental groups. The greatest number of commenters (and thus comments) came from sludge generators. Regulators provided the next most numerous comments. The majority of the comments received from these two groups were that the Proposed Rule was overly restrictive. The scientific community (primarily the W-170 Peer Review) suggested that the regulations as developed were overly restrictive, not scientifically justified and needed major changes. The majority of the comments from the environmental groups were that the Proposed rule should be more restrictive in some areas. However, even they strongly support beneficial use practices over disposal.

Many of the comments were about the use of the 98th-percentile concentrations derived from the "40 City Survey." The other major issue was the restriction on nitrogen loading, which simply is contrary to the philosophies behind practices. There was also considerable support for an exposure risk assessment based approach. This, it was felt, would make the non-agricultural practices more technically based and comparable in concept to agricultural sludge use.

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# EVALUATION OF COMMENTS ON THE PROPOSED STANDARDS FOR MANAGEMENT OF SEWAGE SLUDGE

## Non-Agricultural Land Application

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## Executive Summary

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There were four major types of commenters on the Proposed Rule: 1) the sludge generators, 2) the regulators, 3) scientists, and 4) environmental groups. The greatest number of commenters (and thus comments) came from sludge generators. Regulators provided the next most numerous comments. The majority of the comments received from these two groups were that the Proposed Rule was overly restrictive. The scientific community (primarily the W-170 Peer Review) suggested that the regulations as developed were overly restrictive, not scientifically justified and needed major changes. The majority of the comments from environmental groups were that the Proposed rule should be more restrictive in some areas. However, even they strongly support beneficial use practices over disposal.

Many of the comments were about the use of the 98th-percentile pollutant concentrations derived from the "40 City Survey". The other major issue was the restriction on nitrogen loading, which simply is contrary to the philosophies behind practices. There was also considerable support for an exposure risk assessment based approach. This, it was felt, would make the non-agricultural practices more technically based and comparable in concept to agricultural sludge use.

## Introduction

On February 6, 1989, under authority of Sections 405(d) and (e) of the Clean Water Act (CWA), as amended (33 U.S.C.A. §1251, et seq.), the Environmental Protection Agency (EPA) proposed 40 CFR Parts 257 and 503 *Standards for the disposal of Sewage Sludge*. These proposed regulations had as their objective "...to protect public health and the environment from any reasonably anticipated adverse effects of certain pollutants which may be present in sewage sludge." Within the regulation are requirements for the final use and disposal of sewage sludge when the sludge is applied to the land, distributed and marketed, placed in monofills (sludge-only landfills) or on surface disposal sites, or incinerated.

A new approach was used in developing the technical limits for contaminants from sludge; aggregate and exposure risk assessment. The concept behind this approach was to minimize the risks to individuals and to the population as a whole. Aggregate incidence analyses were made to determine the effect on the whole population, while exposure risk assessment methodologies allowed an analysis of the risk of a pollutant to the most exposed individual, plant, or animal (MEI). Potential pathways were chosen for land application:

1. Sludge-Soil-Plant-Human
2: Sludge-Soil-Human
3: Sludge-Soil-Plant-Animals-Human
4: Sludge-Soil-Animal
5: Sludge-Soil-Plant-Animal
6: Sludge-Soil-Animal
7: Sludge-Soil-Plant
8: Sludge-Soil-Soil biota
9: Sludge-Soil-Soil biota-Predator
10: Sludge-Soil-Air-borne dust-Human
11: Sludge-Soil-Surface water
12A: Sludge-Soil-Air-Human
12W: Sludge-Soil-Ground water-Human

Specific management practices were proposed for non-agricultural land application (§503.16):

(a) Food crops and feed crops shall not be grown or harvested during the period when sewage sludge is applied to that land or for a period of 5 years after the final application of the sewage sludge;
(b) Animals shall not be grazed during the period when sewage sludge is applied or for a period of five years after the final application of the sewage sludge;
(c) A vegetative cover shall be established on the land;
(d) When sewage sludge meeting the Class A pathogen reduction requirements specified in §503.52(a) is applied, public access to the land snall be restricted for the period of time necessary to establish a vegetative cover on the land;
(e) Sewage sludge shall not be applied to the land at rates in excess of the nitrogen requirements of the vegetation (trees, grasses, etc.) and at rates that would cause the excess nitrogen in the sewage sludge to leach to the ground water; and

(f) Sewage sludge shall not be applied to land that is 10 meters (30 feet) or less from a surface water.

It was assumed that these management practices, would eliminate many of the potential pathways that had been identified for agricultural applications. EPA chose to include only two in the aggregate risk assessment:

11: Sludge-Soil-Surface water
12W: Sludge-Soil-Ground water-Human

Due to the assumed limited human contact, cancer risks, summed across the 25 pollutants regulated, resulted in an upper-bound cancer incidence of less than one case per year (0.1). Since estimated exposure was low, EPA chose to base pollutant limits on the sludge quality used in the aggregate risk analysis, i.e., the '98th-percentile pollutant concentration" from the "40 City Study" in addition to the management practices.

EPA accepted comments for a 180 day period following publication in the Federal Register. By the end of this period (August 7, 1989), comments were received from 524 different entities. There were about 3000 pages of comments supplemented with about 3000 pages of attachments. The majority of the comments were received from municipalities with the next number from regulators. Commenters included four environmental groups and 2 peer review groups.

## Categorizing Comments

The procedure used for organizing and assimilating the comments involved six steps. Step 1 was a brief reading of the comments. This was done by the Chief of the Wastewater Solids Criteria Branch (Dr. A. Rubin) as the comments were received in the mail. Step 2 involved assigning the comments a number, and the date of the comment, date received, document type (individual, local, industry, state, academic, etc.) address and number of comment pages (excluding the number of pages in attachments) were recorded. The specific comments then went to members of the team for quick review of the comments and categorizing parts of each document into the major areas, i.e., land application - agricultural, land application - non-agricultural, distribution and marketing, incineration (Step 3). Comments then went to individual team members assigned specific categories. The comments were thoroughly read in Step 4 and divided into specific subcategories, and sections were cut and pasted in a notebook. Staff then developed the specific issues which included reference from each comment (Step 5). The last step was definition of subject/issue areas and development of "Action Sheets". Because these action sheets and specific policy recommendations have not at this time been reviewed by the team, they will not be included in this report.

In the following section comments that specifically related to non-agricultural land application are detailed.

## Specific Comments

### General Requirements

Support for the separation of agricultural applications from non-agricultural applications was made (346, 347, 263). It was noted that non-ag uses are not limited to poor quality sludge (417). There were general comments made such as whether the definitions of non-foodchain crops includes animal feed not intended for human consumption (180), or whether there should be a category for using sludge as a soil amendment for final cover (476, 517). There was a suggestion that there was a need for a systematic approach to setting management, record keeping and reporting requirements (372).

There was a question about application rate limit for non-agricultural applications; that the limit in terms of tonnes/hectare is too restrictive for non-ag particularly for soil reclamation practices as sludge or composted sludge (342, 296). It was evident by this comment that there was some confusion by commenters about the loading restrictions for non-ag applications, since there is no limit on mass loading (other than on the basis of nitrogen).

### Numeric Limits

The use of concentration based numeric limits generated many comments. These limits were set from the use of the 98th-percentile sludge quality from the "40 City Survey". It was suggested that the 98th-percentile sludge quality from the new National Sewage Sludge Survey (NSSS) be used (496), or at least evaluated before these are incorporated into the final rule(361).

The concept of the 98th-percentile was also questioned. The intent of its use in the Proposed Rule was to encourage sludge quality to improve, or at least be maintained in quality. (A commenter wanted EPA to rely on existing pretreatment programs to accomplish this rather than through this regulation (207). Under some conditions active pretreatment was questioned as to whether or not the pollutant concentrations could be met (405).) The "worst" 2% of the sludges for each pollutant would not be allowed for use in this practice. However, the statistical analysis resulting in the 98th-percentile numbers does not exclude only the worst 2% of the generators. There is a potentially that it could even exclude $1-(0.98)^n$, and that additionally it may eliminate more than $1-(0.98)^n$ on the basis of sludge mass (131, 207, 321, 512), since typically the larger sludge generators have higher concentrations of contaminants. Some said that EPA should regulate at the 90th-percentile, while some said at the 100th-percentile (321).

Commenters suggested that this approach either over or under regulates (160,131) and had no scientific or technical basis (160, 131, 207, 475, 321, 358, 248, 512, 448). There was a big concern that these numbers were not supported by risk assessments (147, 358) and that the limits not substantiated by field studies (324). Many commented that this approach has no place in the rule because aggregate risk analysis showed no significant health or environmental constraint (131, 207, 511, 317, 512). In lieu of numeric limits established by the 98th-percentile, the use of a

"good sludge" concept (358, 448) was approached which was based upon actual risk assessment numbers.

The use of the extremely low allowable concentrations for trace organics in sludge (caused by the "40 City Survey" idiosyncrasies) was seen as reducing the desirability of this practice; that there would be an increased perception of a human health or environmental risk (480). Others suggested that these limitations will discourage sludge reuse in favor of higher risk disposal by non-beneficial practices (131, 511). Commenters suggested that it is not logical that a sludge could fail the concentration limit for non-ag yet be used in agricultural or distribution and marketing applications (475, 407, 328).

A comment was made that, generally, pollutant limit differences between ag and non-ag should not be as wide (496). The comparison between approaches for agricultural and non-agricultural was questioned. Maximum loading rates for non-agricultural applications were suggested instead of concentrations (420, 468) to be consistent with agricultural practices. As an alternative it was suggested that EPA use maximum cumulative loadings for metals as specified for ag, with no loading limits for organics if the five year conversion period was adhered to. The conversion period would allow for degradation of most organics (131). Others recommended that EPA use management practices instead of any numeric criteria in some cases (131, 160, 388).

The low allowable concentrations for trace organics especially caused considerable concern and commenters suggested that the "40 City Survey" was inadequate (496, 448, 246, 247). One of the problems was that the detection limits used in the "40 City Survey" were not as low as currently exist, and analysis below detection limits were recorded as "0" rather than the detection limit. This was contrary to the requirement in the Proposed Rule that sludge generators use detection limits as the concentration of contaminant. For many sludge generators and laboratories, the concentration limits are below detection limit for many organics (241, 296, 261). This led many commenters to recommend that EPA should not treat detection limits as actual values (448).

PCB's posed the main problem for generators. There was the concern that the PCB concentration limit will curtail program (324). The limit for PCB's (0.11 ppm) was well below other PCB concentration that are in regulations. PCB limit was not consistent with FDA allowance of 2 ppm in animal feed, 1.5 ppm in milk, 3 ppm in poultry fat, and 2 ppm in fish (207). Soil is not considered hazardous when PCB's are below 50 ppm (207). Again the inconsistency between ag and non-ag applications was apparent, as the concentration for PCB's in ag need to be below 50 ppm, yet non-ag requires 0.11 ppm (3). Many felt that the PCB concentration was set unjustifiably low, and should be set at 5 ppm as recommended by the W-170 Peer Review Committee (352, 259, 455).

## Management Practices

### General

Specific issues were raised in regards to management practices both included and not included within the Proposed Rule. Objections were made to the limitation of applications to frozen, snow-

covered, or flooded land (86, 451). (This should not have been a concern because the Proposed Rule also says "Sewage sludge shall not be applied to frozen, snow-covered, or flooded land *unless it can be demonstrated that the application will not cause a discharge of pollutants into waters of the United States, including wetlands, that violates any requirement of the CWA*" (§503.12(e).) Others said that the requirements were not stringent enough, such as whether or not 10 m is an adequate buffer (113, 496).

### As replacement for numeric limits

The following management practices were recommended to be included in non-agricultural applications by one commenter (517):

- 3' separation from ground water
- 1000' from public well, 200' from private well
- slope restrictions
- pH above 6.0
- 500' from nearest resident, 200' if injected
- 100' from water, 25' from dry run
- monitoring: N, P and pH every 3 years

Other commenters recommended replacement of numeric limits with management practices based on categories of non-ag applications (131, 388, 321, 160, 448). These categories were classified as either low potential for conversion or high potential for conversion. A site that had a low potential for conversion would require management practices only, while sites with a high potential for conversion would require management practices, cumulative metals limits that had been set for agriculture, and a five-year conversion period (131, 160). There was also a recommendation that exceptions be allowed to all management practices on case-by-case basis (131, 160). This would require a need to record cumulative metals loadings (160).

### Vegetative cover

§503.16(c) states "A vegetative cover shall be established on the land". Commenters wanted EPA to define how much vegetative cover is required (388). Others said that requiring vegetative cover prior to sludge application conflicts with concept of establishing vegetation on surface mined land (322, 271, 402). Another problem occurs in regards to dedicated land disposal where land dedicated solely for injection/spreading does not always have vegetative cover (268).

## Land Conversion

Management practices in §503.16(a) require "Food crops and feed crops shall not be grown or harvested during the period when sewage sludge is applied to that land or for a period of 5 years after the final application of the sewage sludge;" and (b) "Animals shall not be grazed during the period when sewage sludge is applied or for a period of five years after the final application of the sewage sludge". This concerned a number of sludge generators as existing programs operate outside of these proposed practices. Comments were formed around the following scenarios.

It was stated that a regulatory prohibition against grazing or feed production stigmatizes the program (241, 244), that non-ag uses would prohibit use in conjunction with crop rotation (248). Use of a particular crop at the time of application should not define the type of sludge use (266). This requirement conflicts with post strip-mining conversion requirements to pastureland (332).

State agencies were concerned that EPA has put the onus for regulating on the state and local level (486).

There were some entities that support the 5-year conversion period as ample time for organic decomposition and decrease of metal bioavailability (207), while others felt that exemptions should apply based on sludge loadings (131).

**Applications within agricultural limits**

If an (series of) application(s) stayed within the cumulative metals limits set for agriculture, then the Rule should allow food or feed crops within 5-year period (197, 346, 347, 355, 241). One recommended that the proposal should be modified from the 5-year to a 1-year conversion period if the sludge complies with pathogen reduction requirements (197); another recommended that three years conversion time is more appropriate (507). Others suggested that the regulations should allow for immediate use if both annual trace organics and cumulative metals limits for agriculture are met (1, 401, 372, 359, 266).

**The basis for the conversion period**

Commenters were concerned that there was no scientific or technical basis for this conversion period, and not supported by technical data (342, 67, 248, 332). Also, it was asked what basis EPA used to come up with 5 years (104). One of the questions was whether EPA had considered that animals excrete most of the ingested metals (207). It was also pointed out that this conversion period (or restriction from any feed production) was inconsistent with 40 CFR 257 (207).

**Protection under conversion**

Commenters were concerned about protection of human health and the environment when property is sold (461,31). In other words, who will be responsible for maintaining the 5-year conversion period if the property is sold? Some suggest that a deed restriction should be required (31). Also the concern over not requiring cumulative metals loading limits might not protect human health even if a 5-year conversion period is used, since metals and organics may greatly exceed ag levels (457, 475, 448). An allowance of up to 380 ppm Cd contradicts past policy in terms of conversion (461). A mechanism for recording cumulative metals loading for non-ag for future conversion was recommended, otherwise this conversion was not consistent with cumulative metals requirement for ag uses (490), as there was a feeling that EPA must protect future uses of the land (503).

### Use of a technical approach

The use of soils tests to assess the safe time to convert (244, 363) was suggested. Some felt that EPA should consider transfer of metals from sludge complex to soil matrix (104).

## Pathogen and Vector Attraction

Access restrictions were the main concern in terms of the requirements for pathogen and vector attraction reduction. It was suggested that the requirement for Class A and vegetation establishment before public access (§503.16(d)) should be eliminated (131, 321). It was felt that the access restrictions will have a negative effect on potential participants (i.e., landowners) (241, 88, 98), and that access restriction should be consistent with definitions of Class A, B and C (131). Due to the nature of most non-ag sites, public access can be restricted by virtue of remote location, fences, signs or other appropriate means (131, 112, 321). The restriction for use of Class C sludge, that the owner cannot access the site, may inhibit Class C sludge use, and there should be no prohibition on access by landowner (402).

Comments were received that Class A treatment should be required for highways, golf courses, forests and national parks (323, 333, 335), particularly due to the high possibility for public contact. It was felt that the use of less than Class A will result in serious public controversy, i.e., the type of national publicity that occurs from the involvement of soap opera actresses, which unnecessarily feeds the NYMBY syndrome (323, 333, 335).

## Site Specific Factors

There were a number of commenters that recommended general case-by-case (or regional) flexibility (346, 347, 355, 358, 88, 131, 451), due to site specifics or management practices. Most of these case-by-case basis exceptions were for management practices (131,160). Specifically, allowance for exception to the 5-year conversion on a case-by-case basis (131), special allowances/exemptions for research (1), and special exceptions for dedicated land (499) were recommended. It was also noted that states will continue to have their own site specific requirements (511).

## Categories of Non-Agricultural Practices

In the Proposed Rule all non-agricultural practices were lumped in together and were subject to the same requirements/limitations. Commenters noted that there should be different requirements for the different practices with the non-ag category. Some suggested that categories should be developed in terms of risk of conversion; low vs. high (131, 160). Others wanted a greater degree of differentiation and suggested these categories: forest systems, reclamation, revegetation, and dedicated land spreading (259, 352, 321, 359, 455, 448). Some simply wanted specific separate categories, such as reclamation (241).

It is difficult to identify and categorize all the potential practices. It appears that turf farming has not been adequately addressed (451), and a recommendation was made that it be included as an agricultural application (389).

## Hunting and Foraging

Although not directly addressed in the Proposed Rule, the Preamble states "...precautions must be taken to preclude hunting or foraging for food." Commenters assumed that the 5-year conversion period for ag use also applied to hunting and foraging. Similar to the restrictive conversion period for grazing and ag use, it was felt that this 5-year restriction was not supported by technical data (346, 347, 3, 256, 241, 112, 131, 271, 402). Research has shown that there is no accumulation in berries (346, 347, 131), and that there would have to be an unreasonable amount of foraging or animal organs consumed to accumulate excessive trace metals (346, 347, 131). It was felt that hunting and foraging restrictions should be consistent with access restrictions (131, 321).

There was a question as to whether range cattle grazing was allowed (3), or what type of animals are prevented from grazing (388). Conversely, commenters wondered what is to stop game from feeding on a sludged area (389, 241, 332). There was a recommendation for requiring fences to keep wildlife from grazing (517), or at least that lands should be properly posted to discourage hunting or other uses (236). Commenters noted that these restrictions will deter potential participants (256, 3), especially fencing requirements (236), and will suggest that sludge is dangerous to wildlife (256, 241).

It was felt that the regulations should maintain the multiple use concept of forests and reclaimed areas, thus hunting/foraging should be allowed (279). Since this approach was inconsistent with pastureland applications (256), it was recommended that if application rates are consistent with ag limits, it should be restricted like agricultural practices (279).

## Risk Assessment

### In lieu of the 98th-percentile approach

In line with the issues that were raised in the **Numeric Limits** section, many commenters recommended that EPA develop numeric (cumulative) limits based on exposure assessment modeling (503, 246, 279, 397, 324, 422, 245, 241, 448, 496). It was felt that the 98th-percentile based (commenting that they were not *scientifically* based (397, 422, 245)) contaminant limits cannot be considered a substitute for wildlife-related or plant exposure pathways (503). Commenters suggested that there was no basis to conclude that numeric limits equivalent to the 98th-percentile pollutant concentrations provide an ample margin of safety (503, 296), and that there is sufficient information available to evaluate the exposure pathways (503). Others disagreed and said that restriction of sludge use in reclamation is premature because research is ongoing (332).

In an exposure risk assessment analysis, it was recommended that EPA should include the following pathways:

- sludge-soil-soil biota (503, 296)
- sludge-soil-soil biota-predator (503)
- sludge-soil-surface water-aquatic life (503)
- sludge-soil-plant-wildlife-human (503)
- sludge-soil-wildlife-human (503)
- sludge-soil-ground water-human (296)
- sludge-soil-surface water-human (296)
- sludge-soil-soil ingestion (279)
- children playing in parks and playgrounds (473)
- contaminant migration to ag lands (499).

In an exposure risk assessment, it was suggested that EPA consider conversion to residential use (503). Others thought that EPA should not use a food-related pathway (499).Then, because the philosophy behind soil reclamation is to reduce a societal liability through sludge application, EPA was encouraged to compare long-term impacts of sludge application to erosion of disturbed land if sludge had not been applied (296). Another issue that commenters suggested for consideration was that mineralization of metals in a forest soil may be different than in an agricultural soil, and EPA should not allow cumulative metals limits to exceed those studied in research (279).

There was a feeling by some that the limits and loading rates should be based on aggregate effects approach (402), but there was also the feeling that the aggregate risk assessments have unreasonable assumptions (448).

## Nitrogen Loading

### General

The Proposed Rule addresses nitrogen loadings for sludge applications to non-agricultural land as follows (§503.16(e)): Sewage sludge shall not be applied to the land at rates in excess of the nitrogen requirements of the vegetation (trees, grasses, etc.) and at rates that would cause the excess nitrogen in the sewage sludge to leach to the ground water".

Although it was suggested that non-agricultural sludge applications should be based on nitrogen requirements (321, 131), or both nitrogen and phosphorus (389), some commenters felt that ground water conditions can more appropriately be addressed at the state level (255). However, rather than basing rates upon the demands of the crop/vegetation, the loading rates should be based on effect of ground water (256). Recommendations were made that there be differentiation between practices (160, 1). There was also the issue about dedicated disposal sites with no vegetation (341); how does this type of practice coincide with this requirement? In any of the practices, the question was raised whether the nitrogen limitation would require ground water monitoring (448).

### Soil reclamation

Many commenters said that sludge application rates can exceed the vegetation's nitrogen requirements without creating detrimental environmental impacts (424, 241, 271, 402, 355). In soil reclamation, the purpose is to provide organic matter (241, 358, 1, 321, 355, 346, 347, 245), not necessarily just to fulfill nitrogen requirements. Thus, soil reclamation should be excluded from nitrogen loading requirement (478, 241, 271, 402, 321, 1, 355, 346, 347, 131, 245, 468, 517, 451). Others said that the regulation should be changed to read "without excess nitrate leaching into the ground water" (considering the dynamics of the ground water aquifer (346, 347)), instead of adhering to "vegetative uptake rates" (271, 402). It was pointed out that EPA's technical support document recognizes the fact that application rates exceed plant nitrogen uptake rates (372, 296).

Some suggested that this requirement would seriously restrict the practice of soil reclamation (241, 3, 1, 346, 347, 332, 256, 448). There was the concern that this nitrogen requirement would preclude the use of sludge with nitrogen fixing species (332). Recommendations were made that EPA weigh the benefits of reclamation against the excess nitrate leaching (372, 321, 3, 160, 265, 296, 131), and that one-time applications do not result in long-term nitrate concentrations (1, 265, 517). One suggested that EPA develop nitrogen risk assessment pathways (448).

### Multiple-year forest applications

The philosophy behind many forest/sludge practices is that multiple-year applications can be made. In this manner, entry into the site and and corresponding site disturbance is limited. Application rates on the average are lower than in agricultural, however some nitrate leaching can be expected in the first year following applications. This restriction on nitrogen loading would impact the philosophy of multiple-year applications (346, 347). Here again it was recommended that the regulations consider the dynamics of the ground water aquifer (346, 347, 131).

### Calculation of nitrogen loading

The intent of "...at rates in excess of the nitrogen requirements of the vegetation..." was not clear to commenters. Commenters wanted to clarify that this took into account the assimilative pathways of nitrogen (346, 347, 131, 341, 105, 228), the fact that nitrogen not released at one time (321, 256), and that soil storage of nitrogen exists (3). The question was also asked about where plant uptake information is available (244).

## Dedicated Disposal Sites

### General

There was considerable comment about the status of dedicated disposal sites. Many suggested that EPA needs to develop a clear direction as to how to regulate dedicated sites (207, 512, 372). It seems that this category has multiple practices associated with it. Some suggested that it should be

eliminated from the non-ag category because it was a disposal practice rather than a beneficial use practice (422, 245, 268), and wondered if it didn't better fit under surface disposal (372, 486, 517).

It was brought up that the practice was encouraged by 40 CFR 257, however it was not recognized in the 503's (207, 512). Others said that it should require environmental monitoring (517), and that the impacts on dedicated land should be evaluated such as effect on wildlife, soil microbiota (517).

### Definition of dedicated disposal sites

The Proposed Rule is inconsistent between requiring rates not to exceed nitrogen assimilation and disposal with no intent of vegetative uptake (517). There was a recommendation that dedicated disposal practices be defined as disposal in excess of nitrogen requirements (463, 21, 245, 268); that it is a treatment process (388). Others suggested that the practice incorporates both treatment and beneficial use (517). The practice needs to include sites both with and without vegetation (422), or that the Rule recognize differences in kinds of dedicated land use (241, 424).

### Conversion

Some sludge generators view and operate dedicated sites as ones they have ultimate control over through either purchase or long-term leases. Thus, even though agricultural limits for nutrients, metals and organics are exceeded, recommendations were made that the Rule needs to allow for animal feed production within the 5-year limitation (207, 512). Some said that growing crops should be encouraged (372).

There was concern for future uses (517), yet it was felt that there ultimately or eventually is a need to convert to other uses, or ownerships (207, 512). Comments were received that conversion should be based on site-specific demonstration that sensitive crop uptake is acceptable (229), but where metals loadings exceeded agricultural limits there should be a caution on the deed that large amounts of metals were added to the soil (229).

## Summary

There were four major types of commenters on the Proposed Rule; each with specific and different involvement in sludge issues. They were 1) the sludge generators, 2) the regulators, 3) scientists, and 4) environmental groups.

It is not surprizing that the greatest number of commenters (and thus comments) came from sludge generators. They are the entities intimately involved in the day-to-day task of sludge management and certainly have the most to lose if regulations are developed that are overly restrictive.

The regulators are also (or should be) intimately involved in the practices both to assure public health and the environment is protected, and to help sludge generators find the most environmentally appropriate sludge management scheme. It is also a major concern to the

regulators if unreasonable standards are developed that prohibit or severely impact existing practices that many of them have spent years at regional, state or local levels developing. The majority of the comments received from both them and the sludge generators were that the Proposed Rule was overly restrictive.

Scientists should play an unbiased role in our society, therefore in theory they should be the most neutral in their assessment of the Proposal. The major input from the scientific community came through production of the W-170 Peer Review, where about 30 of the nations most knowledgeable "sludge" scientists met for a week together and put in considerable other time in formulating their response. That response was that the regulations as developed were overly restrictive, not scientifically justified and needed major changes.

Environmental group involvement was minimal with the exception of the National Resources Defence Council (NRDC). Environmental groups play an important part in our society acting as "checks and balances" to industry, municipalities, and regulation developers. It is no surprise that the majority of their comments were that the Proposed rule should be more restrictive in some areas. However, even in the NRDC document strong support was made of beneficial use practices over disposal. It mainly requested EPA take a more indepth look at pathway analysis and allowable risk.

The comments from the first three groups were generally that the Proposed Rule would result in severe changes, if not elimination, of existing practices. Many of the comments surrounded on the use of the 98th-percentile pollutant concentrations derived from the "40 City Survey". EPA has acknowledged the deficiencies with both the survey and the methodology. Subject to court imposed dates for final promulgation, it appears that major changes in at least the trace organics contaminant limits would result especially with data from the "National Sewage Sludge Survey".

The other major issue was the restriction on nitrogen loading, that in many of the types of practices simply is contrary to the philosophies behind these application techniques. EPA must reevaluate its assessment on nitrogen management in non-agricultural land application.

There was also considerable support for an exposure risk assessment based approach. This, it was felt, would make the non-agricultural practices more technically based and comparable in concept to agricultural sludge use. If this approach is taken, the issues about the 98th-percentile evaporate.

## Commenters on Non-Agricultural Land Application Issues

| Document Number | Name and Location of Commenter |
|---|---|
| 1 | Wayne M. Carlson, North Aurora, IL |
| 3 | 3M Environmental Engineering and Pollution Control, St. Paul, MN |
| 21 | Springfield Metro Sanitary District, Springfield, IL |
| 31 | New England Water Pollution Control Assn., Boston, MA |
| 67 | City of Memphis, TN |
| 86 | City of Winona, MN |
| 88 | Breckenridge Sanitation District, CO |
| 98 | Murfreesburo Water & Sewer Dept., TN |
| 104 | Charles M. Bullard, Pittsburg, PA |
| 105 | City of Memphis, TN |
| 112 | City of Spokane, WA |
| 113 | US Department of Interior, Washington, DC |
| 131 | CSRS W-170 Committee Peer Review |
| 147 | Gina Campbell, Pineville, NC |
| 160 | Madison Metropolitan Sewerage District, WI |
| 180 | South Boyside System Authority, Reedwood City, CA |
| 197 | Enviro-Gro Technologies, Baltimore, MD |
| 207 | District of Greater Chicago, IL |
| 228 | John H. Martin, Cornell University, Ithica, NY |
| 229 | City of Albuquerque, NM |
| 236 | Massachusetts Water Resources Authority, Boston, MA |
| 241 | City of Philadelphia, PA |
| 244 | City of Austin, TX |
| 245 | North Central Texas Council of Governments, Arlington, TX |
| 246 | City of St. Charles, MO |
| 247 | City of Hamilton, OH |
| 248 | City of Phoenix, AZ |
| 255 | Gainesville Regional Utilities, FL |
| 256 | Eileen Seaker, State College, PA |
| 259 | City of Gresham, OR |
| 261 | Hampton Roads Sanitation District, Virginia Beach, VA |
| 263 | NCASI, New York, NY |
| 265 | City of Charlotte, NC |
| 266 | City of Columbus, OH |
| 268 | Dallas Water Utilities, TX |
| 271 | Department of Environmental Resources, Harrisburg, PA |
| 279 | US EPA Region 10, Seattle, WA |
| 296 | Department of Public Works, Los Angeles, CA |
| 317 | USDA-ARS, Beltsville, MD |
| 321 | Washington Suburban Sanitary Comm., Hyattsville, MD |
| 322 | Water and Wastewater Equip. Manufacturer's Assn., Washington, DC |
| 323 | Hydropress N-Viro Services, Inc., Hatfield, MA |
| 324 | Clean Water Program for Greater San Diego, CA |
| 328 | Leather Industries of America, Inc., Washington, DC |
| 332 | State Water Control Board, Richmond, VA |
| 333 | Garret, Old Greenwich, CT |
| 335 | Maclair Energy Materials, Collinsville, IL |

341 City of Colorado Springs, CO
342 Moon Township Municipal Authority, Coraopolis, PA
346 Regional Sludge Management Committee, WA
347 Seattle, Metro, WA
352 Department of Environmental Quality, Portland, OR
355 City of Lima, OH
358 Bio-Gro Systems, Annapolis, MD
359 Department of Ecology, Olympia, WA
361 City of Everett, WA
363 Montgomery County, Dayton, OH
372 U.S. Small Business Administration, Washington, DC
388 US EPA Region VIII, Denver, CO
389 Department of Navy, Alexandria, VA
397 City of Durham, NC
401 City of Tallahassee, FL
402 Browning-Ferris Industries, Washington, DC
405 City of Tacoma, WA
407 Nolte and Associates, Sacramento, CA
417 Public Works Commission, Fayetteville, NC
420 State of Tennessee
422 Illinois Environmental Protection Agency, Springfield IL
424 Great Lakes Sewage Sludge Task Force, St. Paul, MN
448 East Bay Municipal Utilities District, Oakland, CA
451 $CH_2M$-Hill, Redding, CA
455 Association of Oregon Sewerage Agencies, Portland, OR
457 Minnesota Pollution Control Agency, St. Paul, MN
461 The Commonwealth of Massachusetts, Boston, MA
463 City of Columbus, MO
468 Florida Department of Environmental Regulation, Tallahassee, FL
473 US EPA Region I, Boston, MA
475 State of Colorado, Denver, CO
476 California Waste Management Board, Sacramento, CA
478 Ohio EPA, Columbus, OH
480 City of Lafayette, CO
486 Agency of Natural Resources, Waterbury, VT
490 Indiana Department of Environmental Management, Indianapolis, IN
496 Department of Environmental Protection, Augusta, ME
499 Department of Energy, Washington, DC
503 Natural Resources Defence Council, Washington, DC
507 State Water Resources Control Board, Sacramento, CA
511 City of Salisbury, NC
512 AMSA - Land, Washington, DC
517 State of Wisconsin, Madison, WI